Evaluation of Screening Tool to Identify Patients at High Risk for Thirty Day Readmission.

DNP Final Project

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Dedication

This Final Document Project Report is dedicated to my family. My husband, Kevin, has provided unwavering support over the last three years and has given so much of himself in personal sacrifice to help me succeed. Thanks for believing in me.

My children, Alyssa Taylor and Seth Taylor, had to share their college years alongside their mother and they did so with pride and loving support. Alyssa proofread several papers and enjoyed the role of advisor in the writing arena.

Finally, I dedicate this report to my mother Helen Kosier and father McMillian Kosier. Though my father passed away six months ago, together they have supported me in every milestone of my life and career. Dad was looking forward to celebrating this milestone with me. My parents always said "when you…" and never "if you…" The doors of opportunity were always open and my parents did all they could to allow me to fulfill my dreams. I am so grateful to those who have supported me in every way.

Abstract

Background: Unplanned hospital readmissions are common, expensive and often preventable. The ability to identify patients at high risk for readmission allows healthcare workers to implement targeted readmission prevention strategies.

Purpose: The purpose of this project was to evaluate the effectiveness of a 30-day readmission - risk - screening tool in predicting readmission.

Methods: The project used a retrospective chart review from all patient discharges from one calendar year. Data were collected at St. Luke's hospital in Maumee, Ohio. Eligible records were for adult inpatients over 18 years of age whose insurance type was Medicaid or Medicare and who were readmitted within 30 days of their discharge. Patients in observation status, those discharged to hospice care, or those who died during their hospitalization were excluded. Of 1,123 patients with a 30 day readmission over one year, 160 records were systematically sampled to analyze 33 risk variables which were selected by a group of hospital leaders.

Results: The frequency of each risk factor's occurrence was calculated. The top ten items were identified and both Chi-square and odds ratio analyses were calculated for these items. The top ten most common risk factors were: polypharmacy (66%) (p Value .031), difficulty with chronic symptom management (55%) (p Value .013), aggregate of >5 clinical factors (48.7%) (p Value .018), dyspnea (40%) (p Value .257), CAD (51.9%) (p Value .574), and chronic/acute kidney disease (39.4%) (p Value .215).

Interpretation: This project identified both valuable and poorly performing items on a risk-for-readmission tool in order to hone the instrument for use in an 11-hospital system. The ability to target high risk patients for intensive discharge preparation in order to reduce early readmission rates is critical given the use of this factor as a measure of a hospital's quality of care as well as a source of sanctions in reimbursement.

Chapter 1: Introduction, Purpose, and Significance

Introduction

During the past decade there has been a national focus on reducing hospital readmissions in order to reduce the cost of health care in the United States and as a measurable platform to improve quality of care. Hospital readmissions are costly and much too frequent, with typical readmission rates ranging anywhere from 14% to as much as 48% in certain populations of patients. Recent studies estimated a 30-day all cause readmission rate in the United States of 18% to 20%. Among Medicare beneficiaries, readmissions are estimated to cost $17 billion annually (Jencks, Williams, & Coleman, 2009). Because at least some, if not many, early hospital readmissions are avoidable, readmission rates within the first 30 days after discharge are now used for benchmarking quality care across hospitals, with the Centers for Medicare & Medicaid Services (CMS) imposing financial penalties for hospitals with high risk adjusted readmission rates (Donzé, 2013).

In 2009, CMS began publicly reporting readmission rates for certain conditions, and since October 1, 2012, CMS has implemented a payment reduction program to reduce payments to hospitals with excessive early readmissions for acute myocardial infarction, heart failure, and pneumonia (Kansagara et al., 2011; Shulan, Gao, & Moore, 2013). Furthermore, CMS is now considering expanding the list to include other diagnosis groups such as chronic obstructive pulmonary disease (COPD), total hip/total knee replacement, and stroke (Fact sheet: CMS final rule to improve readmissions, 2014).

Many hospitals have adopted various interventions that have been shown to reduce readmission rates such as those found in the Project Boost model. The most commonly adopted interventions include: medication and disease education using the Teach Back methodology,

conducting a follow-up phone call after 72 hours of discharge, and making the patient's follow-up appointment within seven days of discharge (Coleman, Min, Chomiak, & Kramer, 2004).

Due to the complexity of the health care system, the high level of patient acuity illness, and the negative impact of social factors on patient health outcomes, there is no single intervention that has the capability of reducing all readmissions (Hansen, Young, Hinami, Leung, & Williams, 2011). Therefore, many interventions have included a bundle format, combining multiple strategies to address a breadth of factors associated with better hospital-to-home transitions (Linertová, García-Pérez, Vázquez-Díaz, Lorenzo-Riera, & Sarría-Santamera, 2011).

Post-acute care settings have trialed interventions to reduce hospital readmissions. For example, extended care facilities have started to provide more intensive health care services in response to a patient's change in condition rather than sending patients to the emergency room for inpatient admission. These facilities often employ nurse practitioners who routinely round on residents and have the ability to recognize and address subtle changes in patient condition quickly, avoiding serious patient deterioration.

While many hospital-based interventions to reduce readmissions have proven effective in the world of research, they are often so resource intensive that many hospitals have found it difficult to transition research-based interventions. Also, research often targets one patient population, such as those with congestive heart failure (Calvillo-King L et al., 2013). When hospitals translate research interventions into use, they quickly recognize that most interventions effective for reducing hospital readmissions for one population might also be effective for other patient populations (Hansen et al., 2013). However, expanding those interventions to a larger, more diverse patient population meets many barriers including cost, time and scarce implementation resources (Donzé, 2013).

To improve efficiency, the highest intensity interventions should be targeted to patients who are most likely to benefit from costly strategies. Few models exist to predict 30-day readmission risk for the general medical patients (Coleman et al., 2004; Donzé, 2013). Many models in the literature only use retrospective administrative data through coding to identify clinical predictors of readmission. This approach is not helpful to hospitals attempting to target high-risk patients in real-time. There are a few prediction models that use primary data collection concurrently. Many believe that admission is an opportune time to identify patient indicators for risk of readmission (Amarasingham et al., 2010).

Most hospitals have implemented electronic medical health records (EMR) in accordance with the Affordable Care Act Meaningful Use payment model. As hospitals gain in electronic documentation capabilities, they have recognized the opportunity to incorporate readmission risk screening items into the EMR to capture multiple data elements quickly and easily. Such items have the potential to be converted into a daily report for case managers or care navigators to use during discharge planning. This, in turn, permits stratification of readmission risk among patients in order to target key interventions to those at highest risk and improving efficient use of nurses and other providers (Kansagara et al., 2011).

Additionally, in 2013, CMS revised the Discharge Planning chapter of the Conditions of Participation (CoP) to include a requirement for hospitals to use a risk screening tool to identify patients at high risk for readmission as part of the discharge planning process. While CMS recognizes that screening methods are limited in their predictive ability, they nevertheless require this analysis in order to prompt the implementation of targeted interventions whenever possible.

Purpose

The purpose of this project was to evaluate the predictive value of the factors used in the current paper-based screening tool used to identify patients at high risk for readmission at ProMedica St. Luke's hospital in Maumee, Ohio (see Appendix A). This tool was originally designed in 2012 by a team who reviewed the literature on current models for readmission prevention and adopted several key indicators from the Project BOOST (Better Outcomes for Older Adults through Safe Transitions) and Project Re-engineered Discharge (RED) in order to identify patients at high risk for readmission (Hansen et al., 2013). The main body of the tool and risk variables were adopted from the BOOST model since the Institute for Healthcare Improvement (IHI) has adopted the BOOST screening tool as the best currently available. The home-made tool added four indicators not included in the BOOST tool, which include: stairs in the home, history of falls, depression, and needing help managing medication.

This paper screening tool remains in the pilot phase in one of 11 hospitals in the system while the hospital IT department creates an electronic report using real-time medical record information. The remaining 10 hospitals in the healthcare system plan to implement the electronic report version by the end of 2014.

Patient care navigators have used the pilot paper-based tool to identify key risk factors for each patient. Based on the specific risk factor identified, the navigators select among corresponding interventions to implement. For example, if a patient lives alone with limited support and is on more than 10 medications, social services will be consulted to evaluate the need for home health and pharmacy dispensing services will evaluate if the patient can benefit from bundled blister pack packaging for improved medication adherence.

Since 2012, the literature surrounding the topic of preventing readmissions and identifying patients at high risk for readmission has exploded. Therefore, this is an opportune time to evaluate the utility of the risk variables on the current screening tool, eliminate poorly performing variables, and add well performing variables found in recent literature.

Significance

The healthcare industry and CMS are interested in reducing hospital readmissions for two main reasons. First, readmission rates are a quality of care metric. CMS recently began using readmission rates as a publicly reported metric and plans to lower reimbursements to hospitals when standardized readmission rates exceeding the national average (Quality net QIO, 2014). Use of such readmission rates implies that readmissions are related to poor quality of care and are potentially preventable, yet the preventability of readmissions remains uncertain and understudied (Kansagara et al., 2011).

Historically, hospitals have considered readmissions as an inevitable consequence of people being sick and virtually unavoidable. On the financial side, patient admissions generate revenue for hospitals so it is understandable that the push for reducing readmissions has been driven initially from the payer side. While the healthcare industry recognizes that some patients will have readmissions for unforeseen reasons, there are many readmissions that are the consequence of poor care transition planning, poor communication, lack of attention to detail, and not providing as high of quality of care as expected (Coleman et al., 2004; Hansen, Young, Hinami, Leung, & Williams, 2011). This leaves much room for improvement.

Hospitals are not the only accountable party for reducing readmission rates. There has been much debate and pointing of fingers as to who is most accountable for preventing patient readmissions. The main focus has been on the hospital discharge process - both patient

education and overall patient preparation prior to discharge (Brock et al., 2013). Other barriers to improving hospital readmissions include: the availability of the primary care physician to see a patient in a timely manner after discharge, availability of nursing home care, the ability of nursing homes to recognize and address early changes in patient condition to avoid readmission, current payment strategies that allow healthcare providers and organizations to remain financially incentivized for volume-based pay for service, and patient responsibility for timely follow-up and adherence to disease management (Brock et al., 2013; Coleman et al., 2004). Regardless, the quality metric for hospital readmissions is here to stay.

The second reason the health care industry and CMS are interested in reducing hospital readmissions is the need to reduce health care costs. A secondary benefit of higher quality care is cost reduction. Thus, CMS has created a payment model that financially penalizes hospitals based on their rate of readmissions. Due to financial implications, all health care organizations are exploring strategies and developing relationships with community partners to find ways to reduce readmissions.

One of the main reasons for choosing this project was the goal of minimizing the burden on nursing staff that carry significant responsibility for reducing hospital readmissions. Nursing staff and their leaders develop and deploy many of the hospital interventions targeted to reduce readmissions. The majority of interventions, such as increased patient education, calling patients after discharge to support the hospital-to-home transition, implementing elaborate teach-back protocols, and mediating transition communication among multiple healthcare providers and services, typically fall on nurses to implement. With every new initiative, more is added to nurses' workload which causes a strain on resources and potentially impacting timeliness of discharge, patient and family satisfaction, and patient flow in the emergency department. When

a new initiative, such as programs to reduce hospital readmissions are presented, it is imperative that nursing leaders infuse strategies to facilitate efficient bedside nursing practice and eliminate duties that are redundant or that could be outsourced to other disciplines in the hospital, particularly clerical and data entry functions.

This project focused on evaluating the current risk for readmission screening process to assist nurses in identifying patients at high risk of readmission, which allows the nurse to tailor discharge interventions to meet each patient's individual needs rather than providing a one-size-fits-all approach. In order to query some of the key risk factors from the electronic medical record (EMR), the data needs to be entered into the computer. Typically, the nurse enters a large portion of the admission data, but not all data elements are relevant to the nurse in creating an appropriate plan of care, and many data can easily be collected and entered by other disciplines. Subsequently, the query report with multiple subsets of information enables the nurse to plan the patient's care. As responsibilities expand, the nursing profession needs to work smarter and more efficiently, not simply expand its burden of tasks.

There is also global and individual significance to this project. The Institute for Healthcare Improvement (IHI) has created a model, known as the Triple Aim, to optimize the health care delivery system in order to better meet the needs of individual patients through better care and outcomes, improve the overall health of the population, and reduce the cost burden for healthcare (The IHI Triple Aim.2009). Additionally, the components of this project tie directly to five of the eight DNP Essentials, and demonstrate many of the competencies required for degree completion. Each Essential will be addressed and a summary is provided in Appendix B, illustrating how the Triple Aim global initiative is interconnected with the DNP Essentials and the activities of this particular project.

Essential I - Scientific Underpinning for Practice: This DNP project demonstrates the skills to integrate nursing science with biophysical, analytical, and organizations sciences through in-depth literature review and analysis to determine the nature of health care delivery phenomenon involving patient risk for readmission, implementing strategies to improve the healthcare delivery system, and evaluating the outcomes of change.

Essential II - Organizational and Systems Leadership for Quality Improvement and Systems Thinking: This project provides the opportunity to improve patient outcomes and reduce complications and re-hospitalizations. This project enables this DNP student to evaluate the cost effectiveness of care in order to redesign effective and realistic care delivery strategies and enable the bedside nurse to balance productivity with quality care. Through the evaluation of chronic diseases that impact re-hospitalization rates, care interventions can be implemented for specific patient populations such as those with heart failure or kidney disease.

Essential III - Clinical Scholarship and Analytical Methods for Evidence-Based Practice: Through this quality improvement project, the DNP competencies are demonstrated within the performance improvement methodologies, including critical appraisal of the literature, design and implementation of change, predicting or evaluating the outcomes, and finally disseminating practice improvement findings.

Essential IV - Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care: The skills for data extraction and analysis are demonstrated in this project though retrospective electronic record review. The end goal of this project is to provide bedside nurses with an electronically generated report based on risk factors strongly associated with a high risk for readmission.

Essential VI - Interprofessional Collaboration for Improving Patient and Population Health Outcomes: For this project, participation with the initial team that developed the current risk for readmission screening tool demonstrates the competencies of leadership and collaborative practice. After project completion, findings will be presented to the original interprofessional team to stimulate a revision to the current tool and refine interventions to prevent readmissions (see Appendix B).

Project Aim and Objectives

The overarching aim of this project is evaluate the effectiveness of the items in the current risk-of-readmission screening tool, permitting revision of the tool prior to its conversion into electronic format and system-wide use. The specific objectives were to: 1) identify items in the literature associated with patient risk factors for readmission with an emphasis on published data since creation of the tool that are not included in the tool, 2) identify the most common and significant risk factors for early hospital readmission included in the tool and 3) to evaluate the ability of the current tool to identify patients at high risk for readmission.

Chapter 2: Theoretical Framework and Literature Review

This chapter presents the theoretical framework underlying the project. In addition, it provides a comprehensive review of the literature addressing the identification of patients at high risk for post-discharge readmission within 30-days.

Theoretical Framework

This process improvement project occurred in an environment impacted by the national and local healthcare systems and all its players. General Systems Theory (GST) is an organic approach to the study of the general relationships of the empirical universe of an organization and human thought. The theory comes from the field of biology and draws an analogy between organismal function and social organizational function (Roussel, Swansburg, & Swansburg, 2006). General systems concepts form the theoretical underpinnings for other change management models often applied to improvement projects such as this one. The systems approach is appropriate for this project because multiple elements of the patient care system must function efficiently to best prepare patients for discharge such that risk for readmission within 30 days of discharge is reduced as much as possible, and ideally eliminated. Successful patient discharge is only possible when the best data elements are collected (input) and efficiently provided to nursing staff (throughout) to enable the creation of discharge preparation plans tailored to the unique needs and resources of each patient, thus containing costs, by directing time and cost intensive strategies to patients at highest risk for readmission.

The flow of change begins with information input such as identifying the current state of the science on readmission risk identification through literature search, gap analysis, or direct observation. The system then moves through the transformational process, which includes development and implementation of strategies (use of a risk-for-readmission tool and specific

interventions tied to specific risk factors supported by the literature as effective) to achieve the desired outcome; no patient readmissions within 30 days of discharge. This is followed by evaluating the effectiveness of the new strategies in achieving the goal of no patient readmissions within 30 days and revision of strategies shown to be ineffective. The feedback loop allows for analysis of the outcome and opportunity to recommend further improvements and then the process begins again. Using the General Systems Theory approach, change requires interaction among all parts of the system and includes human interaction within systematic processes (see model for this project in Appendix C).

Literature Review

A total of 20 high quality publications were found in the literature were reviewed in depth. These included six systematic reviews and 13 random control trials (RCA). Of the 13 RCAs, eight are included among the systematic reviews and five are recent RCAs published in 2013. These will be discussed individually. Of the six systematic reviews, three offered the most value and relevance related to the aims of this project because they each focused on models or strategies that attempted to predict risk for 30-day readmissions and/or examined patient characteristics associated with readmissions. These included Kansagara et.al. (2011), Calvillo-King et.al. (2012) and Ross et.al. (2008). Two systematic reviews evaluated studies on the interventions targeted to reduce readmissions including Hansen et.al. (2009) and Linertovia et.al. (2011). One systematic review by VanWalraven et.al. (2011), attempted to identify the proportion of hospital readmission that can be deemed avoidable. While the last three systematic reviews may seem less relevant due to the focus on intervention for prevention of readmission rather than risk factors that contribute to readmission, there is discussion and identification of

risk factors in the literature because it is most often the risk factors that are the triggers for implementing the preventive interventions that are being studied.

Predictability of Risk Screening Tools and Risk Factors.

1) Kansagara et.al. (2011) reviewed 26 unique risk prediction models within 30 studies in a systematic review. Fourteen prediction models used retrospective administrative data that could potentially be used for hospital comparison purposes. Nine models incorporated survey or chart review data that could potentially be used for clinical intervention purposes but had poor descriptive ability (c-statistics 0.55-0.65). Seven models could be used to identify high risk patients for early interventions prior to discharge (c-statistic 0.56-0.72). The best performing of these models used administrative data on comorbidity and prior use of medical services (c-statistic 0.77), along with functional status data (c-statistic: 0.83). Six compared models in the same population, and in two of those, functional and social variables improved model discrimination. In summary, half the models reviewed were designed to calculate standardized readmission rates and half were clinical models used to identify high risk patients that could benefit from targeted care interventions. Most models in both categories had poor predictive ability (Kansagara et al., 2011). Kansagara did indicate that high and low risk scores showed an association with readmission rates, even if not statistically significant, and felt this still could potentially be used to direct costly interventions to a select proportion of patients.

2) Calvillo-King et.al. (2013) conducted a systematic review of the impact of social variables on risk of readmission or mortality for patients diagnosed with pneumonia and heart failure. A total of 72 articles were reviewed including 20 that evaluated pneumonia patients and 52 focused on patients with heart failure. Even with inconsistent results, this review found that the social factors of low education, low income, and unemployment were associated with

readmissions in pneumonia patients. For heart failure patients, older age was associated with worse outcomes and social factors affecting readmissions included low income, living situation (rural address), lack of social support, being unmarried and risk factors such as smoking and medical visit non-adherence (Calvillo-King et al., 2013). Few studies have looked at social factors and their contribution to the patient's risk for readmission to the hospital. Even though the populations reviewed were limited to pneumonia and heart failure, social factors likely impact a broad range of patient populations.

3) Ross et.al (2008) conducted a systematic review looking at statistical models and patient predictors of readmission for heart failure patients. A total of 117 studies were reviewed. Only five included models to predict patients' risk for readmission and the remaining studies examined patient characteristics associated with readmission. Overall, there were no patient characteristics consistently associated with readmission and they found no model designed to compare hospital rates of readmission (Ross et al, 2008). Some of the variables evaluated included serum markers, co-morbid conditions, gender, and age. The systematic review is very limited because of the low number of studies reviewed regarding patient predictors of readmission. The majority of the studies reviewed (95 %), were related to finding statistical models for comparing hospital readmission rates.

These three reviews indicate that the studied risk screening tools have inconsistent results and poor predictability overall. Some social and functional variables were found to improved risk discrimination. There was a moderate association with six risk variables indentified across these three systematic reviews including low income, unemployment, living situation, lack of support, unmarried, and medical visit non-adherence.

Interventions and Models to Reduce Rehospitalizations.

1) Linertova et.al. (2011) conducted a systematic review evaluating interventions to reduce hospital readmissions in the elderly over 75 years old. The review is divided into two groups: 1) those interventions that were conducted in the hospital, and 2) those interventions that were conducted in the home after discharge. The majority of the interventions did not have a statistically significant effect on the readmission rate of elderly patients (Linertová et al., 2011). However, some interventions that included home care components were recognized as being likely to reduce readmissions among the elderly, specifically home health nurse visits after discharge.

2) Hansen et.al. (2011) contributed a systematic review on interventions to reduce 30-day re-hospitalization. A total of 43 articles were reviewed, 16 of which were RCTs. This was a well-developed systematic review where the author categorized the interventions into three main domains. The first domain included pre-discharge interventions such as patient education, medication reconciliation, discharge planning, and scheduling a follow-up appointment before discharge. The second domain included post-discharge interventions such as follow-up telephone calls, provider follow-up visits, and post-discharge home visits. The last domain was used for bridging interventions such as the use of transition coaches, physician continuity, and patient-centered discharge instructions. This review was limited because many of the studies were done in single institutions as performance improvement projects rather than experimental designs. Many of the interventions were evaluated as bundles, so this review was unable to determine if any single intervention was associated with reduced risk for 30-day re-hospitalization.

3) Van Walraven et.al. (2011) conducted a systematic review evaluating the proportion of hospital readmissions deemed avoidable. A total of 34 studies were reviewed. Three studies

used administrative diagnosis codes to determine if re-hospitalization was avoidable and the remaining studies used subjective criteria, often with only one reviewer to decide if hospitalization was avoidable. This subjective criterion and a wide variance in study methods contributed to the limitations of this review (van Walraven, Bennett, Jennings, Austin, & Forster, 2011). This study is a good example illustrating why hospitals continue to struggle with identifying which readmissions could be avoidable. Common logic drives hospitals on the continued quest to identify the patient and care factors associated with readmissions that can be effectively addressed.

All three of these reviews studied interventions rather than specific risk factors but often the interventions were triggered by individual patient characteristics. Homecare was identified as an intervention to reduce readmission which was identified by social characteristics such as living also and lack of support. These two social factors were also identified in the first set of systematic reviews. This literature also validated that it is very difficult to determine through a retrospective review if a readmission was avoidable or not.

Individual Studies and Intervention Models.

1) A clinical trial by Gruneir et.al. (2011) that was not included in these systematic reviews demonstrates a potentially valuable risk-for-readmission assessment tool. This was a trial conducted in Ontario, Canada that stratified risk for readmission indicators into high, moderate, and low risk groups. This tool, called LACE (Length of stay, Acuity of illness, Charlson Co-morbidity score, and number of Emergency visits in the last six months) is gaining attention and hospitals have considered, or in many cases, implemented the tool because of its ability to predict readmission. Within the high risk category, the risk was twice as high for 30-day readmission (19%, CI 1.9-2.2), and also twice as high for 90-day readmission (32%, CI 2.0-

2.2). The LACE tool was derived from over 40 patient and hospital variables and intended for use at the bedside, to provide a clinical algorithm to guide care. The full cohort had an average readmission rate within 30 days of 12.6 %. Of those identified as high-risk, 19.1 % had a readmission within 30 days, and 32 % had a readmission within 90 days. Readmission risk was twice as high for the high risk 30-day readmission group (CI 1.9-2.2) than for the low or moderate risk groups.

2) Several studies including Donze et.al. (2013), showed that the number of prior hospitalizations and length of stay of the index admission were important predictors of potentially avoidable readmissions. Van Walraven et al.'s (2011) systematic review also identified that if the index admission was elective, the patient has less risk of readmission than if the index admission was non-elective. Donze et.al. (2013) found that the prediction score identified seven independent factors as most important to the predictive value of the score. These seven factors included hemoglobin at discharge, oncology care, sodium level, procedures performed, index admission type, number of admissions in the past twelve months, and length of stay (Donzé, 2013) .

3) Shulan, Gao, and Moore (2013) is a newer study that was not included in the previous systematic reviews that focused on predicting 30-day all-cause hospital readmissions. Sixty-six independent variables were evaluated including: various demographic characteristics, socioeconomic variables, prior utilization and cost, length of stay (LOS), common comorbidities or DRGs such as COPD, pneumonia, and urinary tract infection. Interestingly, this study identified that a shorter length of stay in the index admission was associated with a higher risk of readmission. Donze (2013) and other historical studies have found a longer length of stay contributes to readmission. There is merit for a discussion regarding patients being discharged

too soon. Overall, this study found that all variables studied had limited predictive power and a more sophisticated patient stratification algorithm is required for accurate readmission predictions (Shulan et al., 2013).

4) Elderlin et. al., (2013) has provided an in-depth review of current conceptual models and frameworks used to guide transitions of care for older adults. The risk screening tool evaluated in this project was adapted from elements of two transition of care models in this review including Project Boost developed by the Society of Hospitalists and Project Re-Engineered Discharge (RED) designed by Boston University Medical Center. Other models discussed in Elderlin's review include the Transitional Care Model (TCM) by Mary Naylor, the Care Transitions (CTI) Program developed by Eric A. Coleman, and the Chronic Care Model (CCM) developed by Edward Wagner. In this review, the author pointed out that polypharmacy is a factor strongly associated with readmissions. He encouraged readers to include education on medication in their discharge planning, and healthcare providers to minimize the number of medications prescribed for the elderly (Ederlin et al., 2013).

5) Project RED is an innovative discharge approach using a bundle of interventions including computer generated discharge instructions, diagnosis education, a discharge summary of care and instructions with an emergency plan, and follow-up telephone reinforcement. This model has demonstrated effectiveness in decreasing emergency visits and re-hospitalizations and is promoted as a means for addressing health literacy issues with its large type and reading friendly layout (Enderlin et al., 2013).

6) Project BOOST (Better Outcomes for Older Adults through Safe Transitions) is also designed to help reduce readmissions. In one study, the BOOST model demonstrated a two-% reduction in readmissions (Hansen et al., 2013). Project BOOST researchers developed a 20-

item tool that predicted readmission to the hospital (Coleman et al., 2004). The researchers conceded that there were no externally validated, easily replicated tools that risk-stratify older patients transitioning out of the hospital. Project BOOST built on these findings. The authors compiled and refined the dominant patient-specific risk factors and created a user-friendly tool called the 8P scale. This risk assessment tool, completed at the time of admission, highlighted the need to identify patients at increased risk for adverse events post- hospitalization, and the need to utilize the duration of the hospitalization to mitigate these risks as much as possible. The 8P's include: problem medications, psychological, principal diagnosis, polypharmacy, poor health literacy, patient support, prior hospitalizations in the past six months, and palliative care. There is no scoring in this tool to identify risk. When the patient triggers an individual variable or risk factor, there are specific interventions identified for that risk category which healthcare workers could implement. There were no chart review data needed to complete the screening tool; however, some elements were subjective for the patient or healthcare provider, such as the section on poor health literacy or quality of life. This model is easily adapted for the acute care setting because it is similar to the nursing plan of care model where gaps or risks are identified and interventions are proposed.

These individual bodies of literature and published models of care have added to nursing's quest to target specific patients for individualized discharge planning. Bundled risk factors, such as in the LACE, Project Red and BOOST tools, are common methods for patient identification of high risk for readmission. Risk factors worthy of further study and consideration for use in a screening tool include hemoglobin, oncology, sodium level, procedures, index admission type, number of admissions in 12 months, length of stay and polypharmacy. Project RED authors identified several determinants thought to be related to readmissions, these include: low health

literacy, low level activity, depressive symptoms, substance abuse, no follow-up with physician, and males were more likely to incur a readmission.

Development of the Readmission Risk Instrument

It is important to identify and synthesize key factors in the literature, but there are prominent risk screening tools and care transition models in use across the country and gaining in popularity that require individual review and evaluation. Since Project Red and BOOST both started as pilot studies in 2007, these models are currently in use in over 400 sites and 85 sites respectively as of 2011 (Brock et al., 2013). Many hospitals in Northwest Ohio and Michigan have adopted collaborative initiatives including Project BOOST and Project RED.

The risk screening tool that is under evaluation for this project includes 33 risk factors involving clinical and social variables, diagnosis specific variables, specific medications and polypharmacy. Many of these variables are also included in the previous literature review. All the diagnoses on the tool are found in various studies including diabetes, chronic obstructive pulmonary disease, heart failure, kidney disease, coronary artery disease, stroke and deep vein thrombus. Three studies found kidney disease as a moderate predictor for readmission including Gruneir (2011), Amarasingham (2010) (included in two systematic reviews), and Shulan (2013).

Most of the clinical and social factors on the screening tool are found in the literature. These include: living alone, chronic symptom management, difficulty reading or low literacy, low income, a history of falls, admission from an ECF, depression, and previous hospitalization. Those risk factors not found in the literature or identified in only a few studies include dyspnea, pressure ulcer, short life expectancy, confusion, and patient concern regarding discharge. Although there is increased discussion and concern in the healthcare community about patient cognitive status in relation to readmission, there were no studies identified which focused on this

variable. Krumholz et al (2000), which was included in two systematic reviews, looked at specific medications and Digoxin is the only one on the screening tool that was included in that study which was found not to be a significant predictor or have an association with re-hospitalization. Other specific medications on the screening tool were not found in the literature review including: aspirin, insulin, anticoagulants, narcotics, and steroids. The last indicator is polypharmacy of > 10 medications. Several studies included poly-pharmacy, but not all specified the definition. Two studies defined polypharmcy as > 7 medications, however, the team that created the home-made screening tool for the hospital defined poly-pharmacy internally as > 10 medications.

There were several risk factors for readmission identified in the literature review that were not included in St. Luke Hospital's screening tool. These factors should be evaluated to determine whether or not one or more of the additional indicators, retrievable from the patient medical record, would improve upon the predictive ability of the tool. Some of the additional indicators to be considered for inclusion are key laboratory results such as creatinine level, a measure of kidney function, the number of previous visits to the emergency room in the past year, length of stay, presence of infection, and social instability**.**

Conclusion

It is important to develop a risk for readmission screening tool that is effective and efficient in gathering information on the risk factors highly predictive of readmission and, therefore, valuable to the nurse in planning care and meeting discharge needs. The ability for the nurse to identify those few patients who are at highest risk for readmission allows him/her to implement patient-specific and targeted interventions that typically require additional resources and time where they are most likely to make a difference.

Chapter 3: Methodology

This chapter provides a detailed overview of the project's methodology. It also addresses two unanticipated barriers encountered.

Project Design

This evidence-based practice (EBP), quality of care evaluation project used a retrospective medical record review to evaluate the effectiveness of the risk-for-readmission tool pilot tested over the past year in selecting information associated with readmission within 30 days of discharge. This project provided an opportunity to identify those demographic, social and clinical variables that, singularly or in combination, mark the patient at high risk for readmission after an acute care hospitalization.

Human Subjects Review and Confidentiality

This project was approved as exempt from review by both The Ohio State University and the ProMedica Institutional Review Board. An electronic data spreadsheet detailing hospital readmissions for Medicare patients and used as a part of the author's normal job function identified all potential records for inclusion in the review. No patient identifiers were included on the data abstraction forms. Thus, there was no means of linking the data collection tool to the patient's visit number to preserve patient confidentiality and privacy. All paper data collection tools and electronic spreadsheets were destroyed once the data aggregation was completed.

Setting

The project was conducted at ProMedica St. Luke's Hospital in Maumee, Ohio. The hospital serves a population of approximately 47,000 in Maumee and the surrounding communities. The hospital is licensed for 302 beds and has an average daily census of one 135

patients with an average of 11,260 discharges annually. The top four primary diagnosis groups served include in rank order: coronary artery disease, COPD, heart failure, and stoke/TIA.

Sample

Population based administrative data identified patients discharged from 7/1/2012 to 6/31/2013. Inclusion criteria included all patients readmitted within 30 days of initial hospitalization, who were over eighteen years of age, cared for on an inpatient unit, (no observation short stay), and Medicare/Medicaid recipients. Exclusion criteria included patients younger than 18 years of age, patients who were observation or short stay only, those with private insurance, and those discharged to hospice or who died before discharge. (see Appendix D)

Procedure

A total of 1,123 discharges met inclusion criteria during the project time frame. A systematic sampling of every fifth record was pulled for retrospective record review. One abstractor (this author) conducted a total of 160 record reviews. The procedure for data abstraction included use of a hospital computer and a data collection sheet. Once all indicators were assessed and the chart was fully reviewed, the abstractor uploaded the aggregate findings into Statistical Package for the Social Sciences (SPSS, IBM Armonk, NY), which is statistical analysis software located at The Ohio State University College of Nursing.

The thirty-three risk factor variables found on the pilot study risk screening tool were listed on a data collection sheet (see Appendix E). One data collection sheet was used for each retrospective medical record that was reviewed and if a risk factor was found to be present in the medical record, the variable was circled (diagnosis) or ‘yes’ or ‘no’ was circled indicating if the risk variable was present or absent. The electronic medical record repository in which the retrospective review was conducted is called ChartMax.

Chapter 4: Results, Discussion, Conclusion

This chapter presents the data analyses and findings for the study. It also offers a discussion of the findings and conclusions based on the overall results.

Data Analysis

The aim of this project was evaluate the effectiveness of the items in the current risk-of-readmission screening tool, permitting revision of the tool prior to its conversion into electronic format and system-wide use. The project evaluated multiple independent, dichotomous variables.

The top ten variables that had the highest frequency for being identified as present in the abstracted data were used for data analysis. The remaining 23 variables were not analyzed due to the low frequency of occurrence in the study population sample. Chi-square analysis was calculated using the variable of 'known re-hospitalization within 30 days' as the index variable to determine the relationship between the index variable and each of the other 10 independent variables. The Chi-square statistic was then used to calculate the p value. Because each variable was analyzed individually, the degree of freedom for all calculations was one.

The odds ratio (OR) was used to assess the degree of association between each risk factor and thirty-day readmission. The OR determined the likelihood that a risk factor will occur in the face of a known 30-day readmission. In addition, a confidence interval (CI) was calculated for each variable to establish that the results indicate a pattern of strength and not just a sampling fluctuation.

Results

During the 12-month timeframe for this project, St. Luke's Hospital had 10,284 inpatient discharges and 1,123 of those discharges experienced a 30-day readmission. This volume translates to a 10.92% re-hospitalization rate with an average of 94 discharges per month returning within 30 days. It was noted during abstraction that many patients experienced multiple admissions prior to the index hospitalization reviewed for this project as well as following the index hospital discharge. Additionally, many of these patients also experienced one or more emergency room visits prior to readmission. The average age of the project population was 72.8 years plus or minus 14 years. The national average of hospitalized patients in the U.S. was 72 in 2005 and 73 in 2010 (Hester, 2013)

There were 33 risk factors evaluated in this project including eight diagnoses, 15 clinical and social factors, eight medication related factors, and two factors involving the number of previous hospitalizations less than 30 days prior to the index admission under review. Of these 33 risk factors, the top 10 in frequency were identified which include: 1) at least on high risk medication, 2) more than two secondary diagnosis, 3) poly-pharmacy, 4) difficulty with chronic symptoms management, 5) coronary artery disease, 6) greater than five clinical or social factors, 7) aspirin, 8) short life expectancy, 9) dyspnea, and 10) chronic or acute kidney disease (see Appendix F).

The 'short life expectancy' variable was eliminated as it only had 19 valid cases in the entire data set. This variable was difficult to abstract from the medical record because it was often missing in the nursing documentation admission history data set, and therefore, was not included in the scoring. This is identified as a judgment question for the nurse and therefore nurses most

likely struggle with making that judgment upon admission, and, of course, that judgment could not be made during a retrospective chart review.

There were 14 individual clinical and social data points on the risk screening tool, and the instructions on the screening tool indicate that if five or more individual variables are identified, then a targeted readmission prevention action plan should be initiated. Three of these variables made it on the top 10 list (excluding short life expectancy). These three included having two or more secondary diagnoses, dyspnea, and chronic symptom management that affects the quality of life.

The results also calculated how frequently five or more of these risk factors appeared for each patient, and 48.7% had five or more risk factors. This variable also made the top 10 list. Only two of the eight high risk diagnosis groups had a frequency rate greater than 39%: chronic or acute kidney disease and coronary artery disease. Both primary and secondary diagnoses were included during medical record abstraction. Heart failure and COPD had a frequency of less than 30%, yet CMS has identified these two diagnosis as associated with high rates of readmission and they are included in the CMS readmission reimbursement model. Coronary artery disease is a very common primary or secondary diagnosis and it was not surprising that 50% of the study population was determined to have coronary artery disease. Chronic or acute kidney disease is much less prevalent in the general population of hospitalized patients as a primary or secondary diagnosis, yet the rate of frequency in this analysis was almost 40%, indicating that acute or chronic kidney disease will need to be included as a strong risk factor for readmission.

There were three variables that made the top 10 list regarding medications. The only individual medication that had a high degree of frequency was aspirin at 45.6%. Knowing that a

large % of the population takes aspirin daily, this variable alone may not be predictive of readmission. Additionally, the variable regarding the % of patients that had at least one high risk medication on the list also scored very high at 82.5%, but again this includes the frequency of aspirin. The next two highest medication groups were anticoagulants at 35% and narcotics at 31.3%, both very frequently prescribed medications in the U.S. The third indicator regarding medications was that of polypharmacy. Patients were scored positive if they had more than 10 medications on their home medication list; 66.3% of the medical records reviewed indicated the patient was taking more than 10 medications. Over-the-counter, PRN, and herbal preparations were not included in the polypharmacy variable.

Of the total 160 records reviewed, only eight did not have even one positive risk variable identified out of all 33 possible variables. This means that 95 % of all records had at least one risk factor in the prior hospitalization section, poly-pharmacy, at least one of the eight listed diagnoses or triggered five or more of the demographic and social risk factors. This indicates that a more sensitive risk screening tool is needed in order to single out patients at greatest risk for readmission. Therefore, further analysis of each individual risk factor was necessary using Chi-square analysis to identify each variable's strength and association with re-hospitalization.

Chi-square analysis was calculated using the variable of 'known re-hospitalization within 30 days' as the index variable to determine the relationship between the index variable and each of the other nine most frequent independent variables. Odds ratios (OR) analysis was calculated to describe the probability of a risk factor being present with a known re-hospitalization (see Appendix G).

Chi-square analysis determined that there is a positive relationship between the index variable of known hospitalization in the previous 30 days and four of the nine risk factors. The

first risk factor is having two or more secondary diagnoses. This variable had a large Chi-square value of 15.562 and $p \leq .000$. However, the strength of this relationship does not imply that there is a causal relationship between hospital readmission and having two or more secondary diagnoses. It makes intuitive sense that any patient having multiple diagnoses would be at increased risk for hospital readmission compared to patients with a single diagnosis. Increasing the variable from two secondary diagnoses to possibly five may better test the strength of this risk factor at a more rigorous level.

Polypharmacy also showed a strong relationship to the 30-day readmission index with a Chi-square value of 4.631 and p value $\leq .031$. Some researchers have described polypharmacy as seven or more medications and some have described as many as ten medications. Knowing that fewer patients are on ten or more medications than those that are on seven, tests this relationship more rigorously, therefore ten or more medications was the cut off.

The next risk factor describing difficulty with chronic symptom management also had a strong relationship to the index variable with a Chi-square value of 6.223 and $p \leq 0.013$. Chronic symptom management was included as a risk variable in only two studies that were evaluated, one of which was Coleman's (2011) Boost Project from which many of the risk variables in the homemade tool were adopted to create the screening tool that was evaluated in this project. Palliative care services are growing rapidly in the healthcare arena indicating that there is a significant need to manage chronic symptoms as an outpatient and therein lies the potential to reduce readmissions.

The last risk factor in the Chi-square analysis with a strong relationship to 30-day readmission is the rollup variable of patients that had five or more of the 15 clinical and social factors such as steps in the home, living alone, limited finances, pressure ulcers, etc. As

described earlier, only three of these indicators had a high frequency rate. Two of those three have shown a significant relationship with the independent variable including having two or more secondary diagnoses and problems with chronic symptom management as previously discussed. The third was dyspnea, which does not show a strong relationship in the Chi-square analysis. The rollup score of more than five of the clinical and social factors has a Chi-square value of 5.58 and $p \leq 0.18$. Even though all 15 variables do not carry a significant relationship to readmission independently, it is clear that rolling them into a composite added to the potential for patients at high risk for readmission to be accurately identified.

The odds ratio and confidence interval analysis provides an alternative view of the probability of one of these risk factors in the presence of the index variable of a previous 30 day hospitalization (see Appendix G). Two of the risk factors did not have an odds ratio >1. These include the factors of having two or more secondary diagnoses and patients who were taking aspirin. The probability of all patients, even outside the population that is analyzed here, to trigger these risk factors would be very common. The remaining seven risk factors all had an odds ratio greater than one, with a 95% confidence interval. These would indicate a high probability of occurring in relation to a re-hospitalization. The four significant risk factors with high odds ratio include: 1) more that two secondary diagnosis (8,67); 2) Polypharmacy (2.359); 3) difficulty with chronic symptom management (2.486); and 4) >5 of 15 clinical/social factors (2.372). Patients with more than two secondary diagnosis are eight times more likely to experience a readmission.

Discussion

Through the retrospective medical record analysis of 33 potential risk factors for readmission that are part of a risk-for-readmission screening tool, six variables were found to

have a significant relationship to the 30-day readmission index variable through Chi square analysis and/or to have a high likelihood that the risk factor occurs in the face of the known readmission through odds ratio analysis. These key risk factors include:

- Polypharmacy > 10 medications
- Difficulty with chronic symptom management affecting quality of life
- The presence of coronary artery disease
- > five of the 15 clinical and social risk factors
- Dyspnea
- Chronic or acute kidney disease

Diagnosis related risk factors did not correlate with current claims data risk factors. CMS has concluded that heart failure, acute myocardial infarction, and pneumonia have the highest incidence of 30-day readmissions. St. Luke's hospital has had zero pneumonia readmissions in the past 14 months. Approximately 12% of the hospital's heart failure patients are readmitted and 10% of patients with acute myocardial infarction patients are included in this retrospective review. Thirty percent of the readmitted patients had an incidence of heart failure, but this was not one of the top ten frequency variables. Interestingly, acute or chronic kidney disease was included in the top 10 frequency variables at 39.4%. St. Luke's hospital is currently involved in an Ohio Hospital Association collaborative project to reduce the incidence of acute kidney injury during hospitalization. The incidence of chronic and acute injury is 12.9% yet over 39 % of the readmitted population evaluated in this project had a diagnosis of acute or chronic kidney disease. The associated p value was not significant, however, the odds ratio indicated there is a good likelihood that acute kidney disease will occur in the face of the known readmission. As an anecdotal note, during the retrospective chart review it was noted that acute kidney injury often

tied with infection, sepsis, dehydration and urinary tract infection. These conditions should be studied in the future as possible risk variables for readmission. The 30-day readmission often involved a re-occurrence of kidney injury as demonstrated in elevated creatinine and potassium levels. The impact of chronic and acute kidney disease should be further evaluated in the future with the potential for improved patient education regarding hydration, diet, and weight/urine output monitoring to prevent readmission of this population.

The clinical and social risk factors, including difficulty with chronic symptom management, dyspnea, and the aggregate variable of five or more indicators are risk factors that should assume a higher level of importance on the screening tool based on the results of this project. Future research needs to be done on the real-time factors that acute care hospitals need to rely on because, as suggested here, patient reported social and clinical factors are valuable markers of risk for readmission.

Polypharmacy of greater than 10 medications was the last variable that showed significance among eight total pharmaceutical variables on the screening tool. It can be argued that this risk factor may not be significant in and of itself because it co-occurs with multiple diagnoses. Although several literature sources already described indicated polypharmcy has merit as an individual risk factor for readmission. Nevertheless, this is an easy variable for the nursing discipline to collect and it can contribute to the value of the risk-for-readmission screening tool.

While the root number of medications a patient takes can be a flag for risk of readmission, it should be noted that medication management overall is a complex issue that can easily put a patient at risk for readmissions and adverse reactions. Researchers have estimated that up to 19% of discharged patients experienced an adverse event after discharge, of which roughly two-thirds were attributed to medications (Foster et al., 2003). Hospitals are challenged with

obtaining an accurate list of patient home medications upon admission and accurately reconciling the final medication list at discharge. "When medication information is not reliably obtained or maintained, then patients can experience adverse outcomes, including adverse drug events (ADEs), emergency department visits, increased length of stay, and increased risk of readmission. Transitions of care such as hospital admission and discharge are particularly prone to medication error risk" (Clay, Quartarolo, 2013). Patients often have more than one healthcare provider ordering medications both inside and outside the hospital based on specialty consultations and individual patient health problems. Each provider is not always aware of what others have prescribed, making it very difficult to avoid drug-to-drug interactions as well as undesirable side effects. Patients may obtain medications at various pharmacies based on pricing, which also decreases the opportunity for a pharmacist to catch potential under/over dosing and drug-to-drug interactions. Modifying the home medication list at discharge, such as changing a dose, can be confusing for the patient which can lead to drug and dosing mix-ups or adverse events (Clay, Quartarolo, 2013).

Hospitals recognize the importance of implementing a care model that includes comprehensive medication reconciliation before discharge and, ideally, again with a homecare nurse or at the next follow-up appointment with their primary care provider. Studies have shown that hospital pharmacists can reduce adverse events and readmissions when they participate in medication reconciliation at the time of admission and discharge (Chen, 2011).

Analysis of this readmissions screening tool has produced information that can drive improvement to make the tool more valuable as a predictive measure of readmission risk. Along with identifying the frequency and relative association to readmission of several key variables on the current readmission risk screening tool, a few other risk factors were identified in the

literature that should be placed under consideration for addition to the risk screening tool. The systematic review done by Calvillo-King et.al. (2013) identified not only several of the social determinants already in the current risk screening tool, but also identified adherence to medical visits as a moderate contributor of readmissions. Patients who do not have a primary care physician are at risk for not following up with a provider after discharge. This information is already assessed upon admission to the hospital and addressed by social services, but it is not a line item on the risk screening tool and it should be added to the paper format and should be a queried item when an electronic risk report is created. Two other variables identified in several bodies of literature include the acuity of illness and length of stay. Both of these variables are reflective of the each other with the understanding that more complex health conditions with multiple co-morbidities often require a longer hospitalization.

There are three risk variables that the literature supports and are included in the current screening tool, but the data collection process and documentation are inconsistent, limiting limits the value of these variables. They include: low income status, medication adherence, and patient literacy. These variables are not the typical yes/no questions that can be asked of a patient during an admission assessment. Analyzing these risk variables requires a more in-depth discussion with the patient using probing questions and non-threatening assessment techniques. Nurse education and improved documentation will elevate the value of these factors.

There are a few risk factors on the current screening tool that are not supported in the literature and were not found to be valuable in this project. The individual medications listed did not add value to the risk assessment. Poly-pharmacy was a better predictor for readmissions and is an easier variable to collect than assessing individual drugs or classes of drugs that are considered to be high risk. In the diagnosis category, cancer and blood clots were not found to be

predictive variables for readmission and are also recommended for removal from the assessment tool. A summary of these post-project recommendations for improving the risk for readmission screening tool can be found in Appendix H.

Conclusion

This project evaluated a homegrown risk for readmissions screening tool that was created by an interdisciplinary team of acute care and home care nurses, social workers, and nursing informatics staff. Two readmission prevention models were examined and the team adapted several key indicators from the Project BOOST (Better Outcomes for Older Adults through Safe Transitions) and Project Re-engineered Discharge (RED) to create a readmission risk screening tool that could be used across 11 hospitals. The ProMedica healthcare system has also implemented a new electronic medical record system called McKesson, and the plan is to incorporate the readmission risk items into the electronic medical record by creating a report that pulls real-time data from the medical record and staff documentation.

Since this team created the draft screening tool, the body of literature and evidence around the topic of preventing readmissions has grown substantially over the last three years. So, before implementing the screening tool across the healthcare system, an evaluation of the risk screening tool was essential through a broader literature search than used initially, and an in-depth retrospective review that would test the current screening tool's value within the hospital's own population. This initiative triggered the birth of an evidence based practice project for this DNP student.

Readmission risk prediction remains a poorly understood and complex task. Acute care hospitals hold only a portion of the accountability for preventing readmissions. Primary care physicians, home health agencies, and the patients themselves also play significant roles in

preventing readmissions to the hospital. However, hospitals are well aware that some initiatives such as accurate medication reconciliation, detailed coordination with the primary care physician, appropriate and in-depth education for the patient, follow-up phone calls after discharge, and facilitating access to post-acute care services can and do reduce 30-day readmissions. Unfortunately, these initiatives require time and resources, most often from the bedside nurse and social workers. Too often, when a good initiative is discovered, it is rolled out to the entire population of patients because what is good for one is generalized as good for all. However, it would be inconceivable to adopt the interventions to prevent readmissions as listed above for every patient. The ability to target high-risk patients through a screening tool, even if it has a marginal level of predictability, is worth introducing with the mindset that healthcare will continue to improve the prediction of readmission as knowledge and understanding grow.

Chapter 5: Summary, Limitations, Implications

This chapter reviews the project and its findings and identifies the project's limitations. Finally, implications for practice are presented.

Summary

This project evaluated the effectiveness of a homegrown risk-for-readmission screening tool currently in the pilot stage through retrospective record review. This evaluation explored the tool's utility in collecting variables using real-time hospital and patient information capable of identifying patients at high risk for readmission among the St. Luke's hospital patient population. Using a systematic selection process, a total of 160 medical records were reviewed out of the 1,123 thirty-day readmissions that occurred between July 1, 2012 and June 31, 2013. Thirty-three risk factors were evaluated during retrospective chart review. They were generalized for into three groups including diagnosis, clinical and social factors, and pharmaceutical factors. There were six key risk factors found to be most common and significant in this population for St. Luke's hospital. These included poly-pharmacy, difficulty with chronic symptom management, coronary artery disease, and an aggregate of greater than five of 15 clinical and social factors, dyspnea, and chronic or acute kidney disease.

Hospitals are required under the CMS conditions of participation to screen patients for risk of readmission as part of the discharge planning process. CMS is not prescriptive in regard to how the screening is conducted, which could be nurse driven through a pre-populated screening tool such as the one in this project or physician opinion, or through historical claims data. The literature documents well that readmission risk prediction is a complex endeavor with many limitations. Most models have poor predictive ability. Through projects such as this, individual hospitals can gain additional perspective on their own specific patient population, individual

performance in discharge planning, and identifying patients at greater risk for avoidable readmission to the best of one's ability despite the limitations in current understanding of important factors affecting risk.

Limitations

There were two significant limitations to this project. The first limitations is that only one sample population was used; those patients who were known to have a readmission within 30 days of the index admission. Evaluating the frequency of risk variables for patients who did not have a 30-day readmission may have added to this project. To adjust for this limitation, the screening tool risk factor that assessed if an admission occurred within 30 days before the index admission was used as the index variable for Chi square analysis. Future studies may want to consider using a comparison group for a more robust data analysis.

The second limitation involved the data collection in the medical record. Many of the risk factor variables on the screening tool have been built into the electronic medical record in the nursing history section. Nurses' documentation was inconsistent and several questions in the nursing history were not addressed or documented. For example, variables such as the ability to read, limited financial resources, and depression are included in the nursing history template, but in some records this information was missing, thus limiting the overall data collection for this project. Additionally, since the ultimate goal at the end of this project is to create an electronic report to find patients who are at high risk for readmission, it will be necessary to have all the risk variables addressed and documented in the appropriate place in the medical record for the report to be accurate and useful. In the future, the nursing staff will need to be educated on the risk variables that must be addressed and documented in order to gain the full benefit of screening patients for 30-day readmission risk.

Implications

The implications of this project are two-fold. The expansion of knowledge regarding the incidence of, risk factors for, and interventions needed to anticipate and prevent 30-day hospital readmissions is invaluable. The principal investigator will apply this knowledge to recommending changes to the current risk for readmissions screening tool, educating staff on the use of the tool, and working with the informatics team to build an electronic report from real-time data. The result should be a report that front-line nurses can use to help them identify patients at high risk for readmission alerting them to the need for implementing individualized and targeted patient centered interventions.

The metric of readmission rates has been tied to quality of care even though the causes of readmissions and their preventability continue to be unclear and understudied. Nevertheless, the nurses are expected to identify patients at risk whether for readmissions, complications, or any other variable, and then create an action plan that will positively impact the patient, reduce 30-day readmissions, improve overall quality of care and outcomes, and improve patient satisfaction.

Costs and resources continue to be a driving force behind hospital initiatives in innovation and ongoing improvement in care delivery. The Affordable Care Act requires CMS to reduce payments to hospitals with excess readmission rates compared to the national average in 2014, starting with a 1% reduction and increasing to a 3% reduction in Medicare payments by 2016. The nursing discipline has an obligation to participate in strategies that impact reimbursement around 30-day readmissions. The DNP-prepared leader who practices within a complex system at the organizational level, has the knowledge and competency to identify potential problems, such as the cost and quality impact of unplanned readmissions, and then develop interventions to

address these problems. The DNP nurse leader has the opportunity to identify system issues through day-to-day experiences and to use innovation to positively impact patient and systems outcomes (Montgomery, Porter-O'Grady, 2010). This particular project demonstrates the value of change and innovation that directly impact the quality of patient care across the continuum. Through the evidence-based practice (EBP) problem solving approach for the delivery of care, along with harnessing innovation and technology, the DNP nurse leader can improve patient outcomes and reduce the cost of healthcare delivery. This project demonstrated the first steps of the EBP process with in-depth evaluation and analysis of the problem. The next steps for the DNP leader will be to share the results and educate the nursing workforce on the impact of quality and cost related to 30-day readmissions and develop inter-professional relationships with the key players who will help to drive the interventions that will be put in place to screen patients for high risk of readmission and ultimately reduce unplanned readmissions.

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Appendix A

ProMedica Risk for Readmission Screening Tool draft for pilot trial, 2013

Re-Hospitalization Risk Assessment
Purpose: Screening tool to identify those at risk of re-hospitalization

Date: _____ Time: _____
Admit Date: _____ Primary Provider: _____

1. Prior Pattern: *Check all that apply*

- ☐ > 3 hospitalizations or ED visits in past 3 months = complete care plan.
- ☐ Re-hospitalization within 30 days.

NOTE: SCHEDULE FOLLOW-UP APPOINTMENT WITH HEALTHCARE PROVIDER 3-5 DAYS POST DISCHARGE DATE IF EITHER BOX IS CHECKED.

2. Medication Management: *Check all that apply*

a. ☐ High Risk Medications: specifically anticoagulants, insulin, Aspirin, plavix, digoxin, narcotics, diuretics, steroids OR Polypharmacy (>7 prescription medications – not PRN)
b. ☐ Non-adherence with medication regimen

3. Diagnosis/Chronic Conditions: *Check all that apply*

☐ HF	☐ Diabetes	☐ Stroke/CVA/TIA	☐ CAD/Myocardial Infarct
☐ COPD	☐ Cancer	☐ Blood Clot/VTE	☐ Hemodialysis/Kidney Failure

4. Risk Factors: *Check all that apply*

a. ☐ More than 2 secondary diagnoses
b. ☐ Limited financial resources to meet basic needs
c. ☐ Lives alone
d. ☐ Limited support network (patient support)
e. ☐ ADL assistance needed
f. ☐ Stairs
g. ☐ Dyspnea
h. ☐ Pressure or stasis ulcer
i. ☐ Issues with chronic symptom management that affects quality of life (nursing judgment)
j. ☐ Short life expectancy/ poor prognosis
k. ☐ Difficulty reading – Are you happy with how well you read?
l. ☐ Confusion or altered mental status
m. ☐ Non compliance with lifestyle changes, e.g. smoking, drinking, illicit drug use
n. ☐ History of fall(s) or near falls.
o. ☐ Admitted from ECF
p. ☐ Depression/mental health challenge
q. ☐ Concerns about going home e.g. Lack of transportation

Adapted from BOOST. Complete Re-hospitalization Prevention Care Plan for 5 or more checked items or for any item in #1 or #2

_____ _____
Signature Date

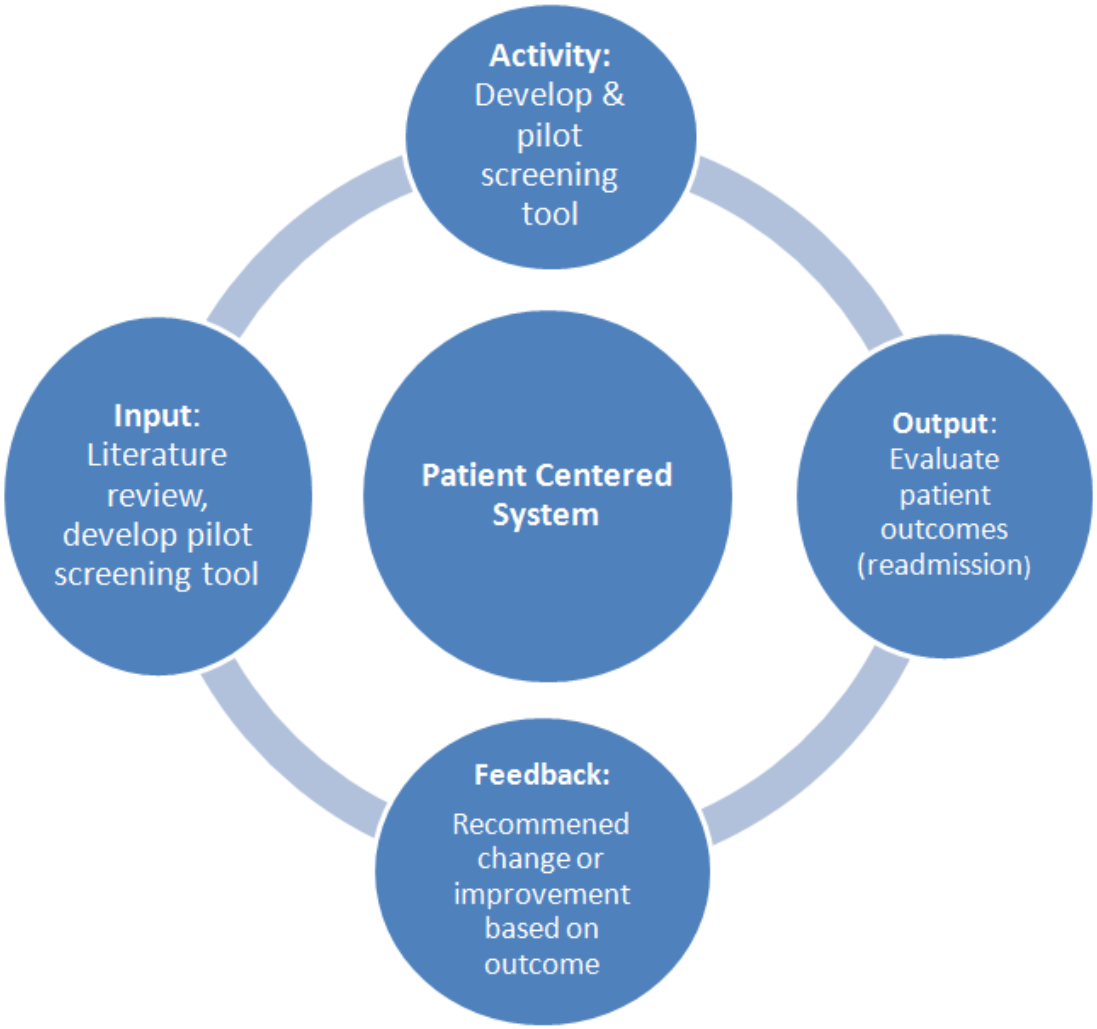
Appendix B

Relationship of Triple Aim to DNP Essentials with DNP Project Activities

Triple Aim	National Quality Strategy	DPN Essentials	DNP Project
Population Health	Healthy people/healthy communities - improve the health of the US population by supporting proven interventions to address behavioral, social, and environmental determinants of health	I. Scientific Underpinnings for Practice II. Organizational and Systems Leadership for QI and Systems Thinking VI. Interprofessional Collaboration for Improving Patient and Population Heath Outcomes	▪ Evaluation of chronic disease and barriers to chronic symptom management ▪ Population specific care interventions ▪ Participation in OHA-HEN collaborative (reduce readmissions 20 %) ▪ Interprofessional team leadership - create change in the delivery of care
Patient Experience	Better Care - Improving the overall quality by making health care more patient-centered, safe, effective, timely, efficient, and equitable.	I. Scientific Underpinnings for Practice II. Organizational and Systems Leadership for QI and Systems Thinking III. Clinical Scholarship and Analytical Methods for EPB IV. Information Systems/Technology for the Improvement of Healthcare	▪ Implement effective care interventions ▪ Improve patient safety through effective care transition plans ▪ Critical appraisal of the literature ▪ Data analysis ▪ Predict and analyze outcomes ▪ Identify gaps in evidence and practice ▪ Disseminate findings ▪ Use of EMR data ▪ Electronic report for high risk for readmissions
Per Capita Cost	Affordable care - reduce the cost of quality health care for individuals, families, employers, and government	I. Scientific Underpinnings for Practice II. Organizational and Systems Leadership for QI and Systems Thinking	▪ Evaluate Cost of care ▪ Reduce readmission ▪ Evaluation of outcomes

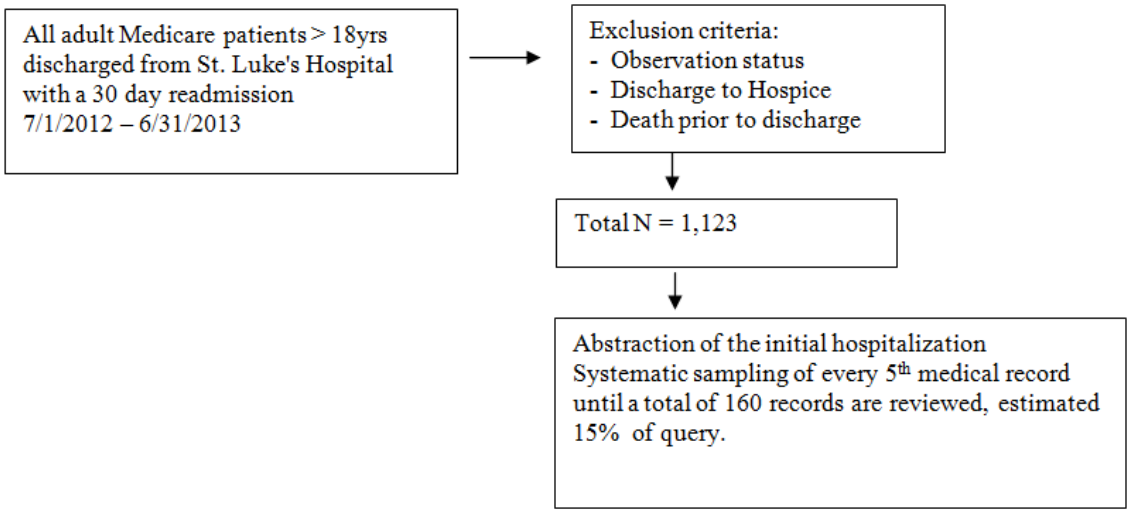
Appendix C

General Systems Theory Improvement Project Model



Appendix D

Sampling method used for medical record review



Appendix E

Data Collection Form

Data Collection Form DNP Project Student - Rebecca Taylor

Case # _____ (1-220) Systematic Random Selection every 5th record or 1,100
Instructions: circle appropriate subset for each indicator found during medical record review.
Do not include any PHI information on this form.

Data Set	Subset	Subset	Subset	Subset	Subset	Subset	Subset	Subset
Diagnosis	Diabetes	Heart Failure	Cancer	COPD	CKD ESRD	CAD AMI	Stroke TIA	DVT
>3 hospitalizations in or ED visits in past 3 months	Yes	No						
Known re-hospitalization within last 30 days	Yes	No						
More than 2 secondary diagnosis	Yes	No						
Limited financial resources to meet basic needs	Yes	No						
Lives Alone	Yes	No						
Limited Support Network	Yes	No						
ADL assistance needed	Yes	No						
Stairs at home	Yes	No						
Dyspnea	Yes	No						
Pressure or Stasis Ulcer	Yes	No						
Issues with Chronic symptom management that affects quality of life	Yes	No						
Short life expectancy/poor prognosis	Yes	No						
Difficulty reading – are you happy with how well your read?	Yes	No						
Confusion or altered mental status	Yes	No						
Non-compliance with lifestyle changes, e.g. smoking, drinking, illicit drug use	Yes	No						
History of fall(s) balance/weakness	Yes	No						
Admitted from ECF	Yes	No						
Depression/mental health challenge	Yes	No						
Concerns about going home e.g. Lack of transportation	Yes	No						
High Risk Medications	Aspirin	Insulin	anticoagulant	Digoxin	Narcotics	steroids		
Poly-pharmacy >10 prescription medications (not PRN)	Yes	No						
Non-Adherence with medication regimen	Yes	No						

Appendix F

Table F1

Frequency of Risk Factors - Top 10 in Rank Order

Risk Factor	# Yes	# No	Valid %
At least one high risk medication	132	28	82.5%
More than 2 secondary diagnoses	115	45	71.9%
Polypharmacy > 10 medications	106	54	66.3%
Difficulty with chronic symptom management	88	72	55.0%
Coronary Artery Disease*	83	77	51.9%
>5 of the 15 clinical and social factors	73	77	48.7%
Aspirin - high risk medication	73	87	45.6%
Short Life Expectancy	8	11	42.1%
Dyspnea	64	96	40.0%
Chronic or Acute kidney disease	63	96	39.4%

* Includes primary and secondary diagnosis

Appendix G

Table G2

Analytical Results of Top 9 Risk Factors

Risk Factor	Chi Square Value	p Value*	Odds Ratio	CI 95% =
At least one high risk medication	.313		1.304	.513 - 3.314
More than 2 secondary diagnoses	15.562	.000	8.67	2.535 - 29.688
Polypharmacy > 10 medications	4.631	.031	2.359	1.066 - 5.221
Difficulty with chronic symptom management	6.223	.013	2.486	1.203 - 5.137
Coronary Artery Disease	.316		1.216	.614 - 2.409
>5 of the 15 clinical and social factors	5.585	.018	2.372	1.149 - 4.898
Aspirin - high risk medication	2.53		.0839	.422 - 1.66
Dyspnea	1.285		1.488	.747 - 2.961
Chronic or Acute kidney disease	1.540		1.545	.776 - 3.079

* Only significant p values are presented

Appendix H

At the conclusion of the project, the summary recommendations for improving the current risk for readmission screening tool include:

1. Keep and emphasize the high level and significant risk variables identified in this project:
    - More than 2 secondary diagnosis (OR 8.67)
    - Polypharmacy > 10 medications (OR 2.359)
    - Difficulty with chronic symptom management affecting quality of life (OR 2.486)
    - > five of the 15 clinical and social factors (keep all 15 individually) (OR 2.372)
    - Prior hospitalization and ED visit patterns
2. Consider retaining secondary level risk factors
    - Presence of Coronary artery disease (specify HF and AMI)
    - Dyspnea
    - Prior hospitalization and ED visit patterns
3. Remove those risk variables that are not supported in the literature and were not identified as significant in this project; those variables include:
    - All individual high risk medications - aspirin, steroids, narcotics, anticoagulants, insulin, and digoxin. Polypharmcy is a better predictor for readmissions and is an easily attainable indicator.
    - Of the eight diagnosis on the risk screening tool, cancer, blood clot/DVT were not found to be associated with readmissions
4. Enhance the data collection process and documentation of the following variables that are currently on the risk screening tool and the literature supported them as valuable but could not analyzed in this project do to missing or inconsistent availability:

- Low income status / limited financial resources
- Medication adherence
- Literacy assessment

5. Add the following risk variables that have been identified in the literature as potential contributor to readmissions, consider pilot testing on the modified screening tool:
    - Acuity of illness
    - Length of stay
    - Physician visit adherence - patients without a designated primary care physician